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An assessment of "Spring"

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In view of the frequent recurrence of statements of the type "the worst spring since ..." it was decided to examine spring weather over a number of years to see whether some reasonably objective assessment of the "goodness" or "badness" of spring could be made.

A number of obstacles became immediately apparent:-

a. What period does one consider as "spring"?

b. What constitutes a "good" spring?

c. Does one consider weather at several representative stations or make some estimate of aereal or district values as in MWR Table 1.

It was originally intended to make an evaluation of the season in an agriculturally significant form but because of the month by month variation in the optimum value of various parameters available this approach was abandoned in favour of a general approach on the basis that a dry, warm, sunny spring is "good" and a cold, wet, dull one is "bad".

To include very early as well as very late springs, the four months February to May were examined for departures from average of air and 1 foot earth temperatures, rainfall and sunhine.

Initially the district values in MWR Table 1 were examined but year to year comparisons proved invalid because of changes from time to time of the stationsused as well as periodic revisions of the base averages.

In the end, a selection of eight stations with long term records was made and the 25-year period 1945-69 analysed for departure from average. The averages used were 1931-60 for temperatures and sunshine and 1916-50 for rainfall and a system of "scores" devised according to departures from these averages (Fig 1) so that a low "score" indicated a poor spring.

/Figure 1

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Figure 1.

"Climatic score for Spring"

Score	Air and Earth Temperature (Departure from Average)	Rainfall (% of average)	Sunshine
1	≥ -5.6°C	≥ 200	≤ 30
2	-5.5° to -4.6°	150 to 199	31 to 45
3	-4.5° to -3.6°	100 to 149	46 to 60
4	-3.5° to -2.6°	50 to 99	61 to 75
5	-2.5° to -1.6°	< 50	76 to 90
6	-1.5° to -0.6°		91 to 105
7	-0.5° to +0.4°		106 to 120
8	+0.5° to +1.4°		121 to 135
9	+1.5° to +2.4°		136 to 150
10	≥ +2.5°		≥ 151

The score retains some agricultural significance in that earth temperatures and sunshine are included but for real usefulness in agricultural terms it would be necessary to consider threshold values of temperature (varying according to crop and time) as well as optimum values of rainfall (varying according to soil moisture status and farming operations i.e. cultivation or crop growth). Rainfall has been given less weight since the effects of variations are are generally more transient than those of temperature and sunshine.

Without going into considerable additional detail in month by month analysis, it is not possible to take account of "false springs" i.e. where a very early mild, open spell is followed by a return to cold weather before the real start of spring. Some form of weighting for this on-off type of spring would have to be built in to any eventual agricultural index.

It is somewhat surprising how few stations have 25 years continuous records of the four selected parameters. In fact it was not possible to find such a station in north Wales or in north east England. The eight stations used in the study are, however, fairly representative of regional conditions in the remaining areas and conclusions drawn from the analysis can be applied (with caution) on a regional basis.

It must be admitted that, in this type of investigation, by a careful selection of stations, parameters (or combinations of these), and period, it would be possible to prove almost anything. In this instance, however the analysis has been made without "vested interest" in any particular conclusion and the selection of stations and period to be considered was largely determined by factors other than the author's aims.

The following three tables indicate coldness, wetness and dullness of the four month period as a whole. In each case low scores indicate poor springs. The three best springs for individual stations are underlined; the three worst marked by an asterisk.

/Table 1

Table 1

Spring Coldness
(Sum of scores for air and earth temperatures)

Year	Durham	Cranwell	Cambridge	Leckford	Shrewsbury	Oxford	Cardiff	Plymouth	Average	Rank Order
1945	69	68	69	70	70	71	69	67	69.1	25
1946	62	58	59	58	64	58	58	61	59.8	15
1947	44*	50	44*	44*	44*	44*	42*	46*	44.8	1
1948	64	63	66	64	66	64	61	62	63.8	22
1949	62	60	58	61	62	60	61	61	60.6	18
1950	58	57	60	59	61	60	62	64	60.1	16=
1951	47	47	47*	46*	49	48	48	50	47.8	5
1952	62	61	64	61	62	61	62	57	61.3	19
1953	61	57	58	54	57	55	57	57	57.0	12
1954	51	48	53	53	54	52	54	54	52.4	9=
1955	46*	46*	49	46*	45*	45*	45*	43*	45.6	4
1956	50	50	48	47	49	46*	50	47	48.4	6
1957	61	65	65	66	63	65	66	67	64.8	23
1958	48	53	53	53	53	52	54	53	52.4	9=
1959	62	64	61	63	66	61	64	61	62.8	21
1960	61	61	61	67	61	59	62	60	61.5	20
1961	68	69	68	69	70	70	70	68	69.0	24
1962	52	51	47	47	51	48	50	47	49.1	7
1963	49	45*	43*	45*	48	43	44*	45*	45.3	2
1964	57	57	57	59	58	56	61	55	57.5	13
1965	55	53	54	53	53	53	54	51	53.3	11
1966	55	58	61	61	62	61	61	62	60.1	16=
1967	60	59	60	59	59	60	61	56	59.3	14
1968	52	54	53	50	50	53	50	49	51.4	8
1969	45*	43*	47*	46*	43*	47	45*	47	45.4	3

The theoretical range of possible scores is from 80 to 8 but in practice any score over about 70 would be exceptionally mild while one under about 45 would be exceptionally cold.

In general, 1947 was the coldest spring over much of the country with 1963, 1969 and 1955 also very cold. The major contribution to the coldness of 1947, however was the prolongation of a severe winter into the "spring" period whereas in the other three years the second half of spring was colder than in 1947 and probably had a greater adverse effect on agricultural operations.

/Table 2

Table 2

Spring Wetness

Year	Durham	Cranwell	Cambridge	Leckford	Shrewsbury	Oxford	Cardiff	Plymouth	Average	Rank Order
1945	15	14	16	17	14	15	13	16	15.0	18=
1946	15	15	14	13	15	13	14	15	14.3	13
1947	8*	13	13	13	11	13	12*	11*	11.8	5=
1948	17	15	14	14	15	15	14	16	15.0	18=
1949	18	15	16	15	16	14	14	15	15.4	20=
1950	14	12	12	11*	12	11*	12*	12	12.0	7
1951	10	9*	8*	8*	10*	9*	12*	12	9.8	1
1952	16	15	14	13	17	15	14	13	10.9	3
1953	15	14	15	15	14	16	13	14	14.5	14
1954	13	14	12	17	14	13	14	13	13.8	10=
1955	15	11*	15	15	12	14	14	14	13.8	10=
1956	18	18	18	18	18	19	18	19	18.3	25
1957	16	15	15	16	17	14	12*	13	14.8	15=
1958	10*	13	13	17	15	14	15	15	14.0	12
1959	19	16	16	15	14	13	16	15	15.5	23=
1960	14	17	17	15	15	15	16	14	15.4	20=
1961	15	16	16	14	15	14	14	14	14.8	15=
1962	15	16	16	16	15	17	14	15	15.5	23=
1963	14	15	14	11*	15	14	13	13	13.6	9
1964	13	14	12	12	15	13	13	11*	12.9	8
1965	13	16	15	15	14	14	16	15	14.8	15=
1966	11	11*	15	11*	10*	12*	10*	10*	11.3	4
1967	14	11*	11*	10*	12	13	10*	13	11.8	5=
1968	17	16	17	14	16	16	14	13	15.4	20=
1969	8*	8*	10*	13	10*	13	13	11*	10.8	2

Theoretical scores range from 20 = very dry to 4 = very wet.

/Table 3

Table 3

Spring Dullness

Year	Durham	Cranwell	Cambridge	Leckford	Shrewsbury	Oxford	Cardiff	Plymouth	Average	Rank Order
1945	29	28	26	27	27	28	25	26	27.0	20
1946	28	28	22	25	27	25	25	23	25.4	16=
1947	21	19*	18*	16*	18*	16*	15*	14*	17.1	1
1948	30	28	31	34	32	32	33	32	31.5	24
1949	32	28	30	30	31	31	28	29	31.8	25
1950	28	25	24	24	23	25	21	24	24.3	14
1951	22	22	23	22	25	23	25	26	23.5	11
1952	28	27	28	24	25	27	26	24	26.1	18
1953	30	25	27	26	27	27	28	28	27.3	21
1954	19*	19*	23	24	23	25	26	25	23.0	9
1955	27	28	30	26	31	29	29	30	28.8	23
1956	25	27	29	26	28	28	31	32	28.3	22
1957	25	26	29	23	25	26	24	25	25.4	16=
1958	21	25	25	20	24	23	21	18*	22.1	7
1959	20*	24	24	24	22	23	22	27	23.3	10
1960	24	23	23	22	21	23	23	24	22.9	8
1961	24	26	26	24	23	25	22	21	23.9	12
1962	26	25	23	25	25	23	25	24	24.5	15
1963	24	21	18*	22	23	20*	23	24	21.9	6
1964	20*	21	18*	18*	20*	19*	16*	18*	18.8	2
1965	22	20*	19	22	21	20*	22	22	21.0	4
1966	20	21	19	19*	22	20*	22	20	20.4	3
1967	26	27	29	26	25	28	26	25	26.5	19
1968	25	25	22	26	24	24	21	25	24.0	13
1969	21	20*	23	20	18*	24	20*	23	21.1	5

Theoretical scores range from 40 = very sunny to 4 = very dull; in practice though the range is from about 30 to 15.

Combining these three tables to give ranking order for springs (1 = coldest, wettest and dullest; 25 = warmest, driest and sunniest) we find.

/Table 4

Table 4

Overall scores and Rank order for Springs

(Rank order in small type)

Year	Durham	Cranwell	Cambridge	Leckford	Shrewsbury	Oxford	Cardiff	Plymouth	Average	Ranking Order
1945	113 25	113 25	111 24=	114 25	111 24	112 25	107 24	109 24	111.3	25
1946	105 18	101 17=	95 12=	96 17	103 19	96 14=	97 14=	99 17=	99.0	17
1947	73 1	82 5	75 1=	73 1	73 2	73 1	69 1	71 1	73.6	1
1948	111 23	106 22=	111 24=	112 24	113 25	111 24	108 25	110 25	110.3	24
1949	112 24	103 19=	104 20	106 22	109 23	105 21=	103 22	105 22=	105.9	22
1950	110 22	94 12	96 15	94 14	96 14=	96 14=	95 13	99 17=	97.5	14=
1951	79 3=	78 2	78 3	76 2	86 3=	80 3	87 6	88 8=	81.5	4
1952	106 19=	103 19=	106 21	98 18	104 20=	103 20	102 19=	94 13=	102.0	20
1953	106 19=	96 15	100 16=	95 15=	98 17	98 18	98 16	99 17=	98.8	16
1954	83 5	81 3=	88 7=	92 13	91 8=	90 10	94 12	92 11=	88.9	8
1955	88 8	85 6	94 11	87 5	88 5=	88 6=	88 7	86 5=	88.0	5
1956	93 11=	95 13=	95 12=	91 11=	95 13	93 12=	99 17	98 15=	94.9	13
1957	102 17	106 22=	107 22	105 21	104 20=	105 21=	102 19=	105 22=	104.5	21
1958	79 3=	91 9	91 9	90 8=	92 10	89 9	90 9	86 5=	88.5	6
1959	101 16	104 21	101 18=	102 19	102 18	97 16=	102 19=	103 20=	101.5	19
1960	99 14	101 17=	101 18=	104 20	97 16	97 16=	101 18	98 15=	99.8	18
1961	107 21	111 24	110 23	107 23	108 22	109 23	106 23	103 20=	107.6	23
1962	93 11=	92 10=	86 5	88 6	91 8=	88 6=	89 8	88 8=	89.4	10
1963	87 7	81 3=	75 1=	78 3	86 3=	77 2	80 3	82 3	80.8	3
1964	90 9=	92 10=	87 6	89 7	93 11	88 6=	86 5	84 4	88.6	7
1965	90 9=	89 7	88 7=	90 8=	88 5=	87 5	92 10	88 8=	89.0	9
1966	86 6	90 8	95 12=	91 11=	94 12	91 11	93 11	92 11=	91.5	12
1967	100 15	97 16	100 16=	95 15=	96 14=	101 19	97 14=	94 13=	97.5	14=
1968	94 13	95 13=	92 10	90 8=	90 7	93 12=	85 4	87 7	90.8	11
1969	74 2	71 1	80 4	79 4	71 1	84 4	78 2	81 2	77.3	2

It appears, that over much of the country, 1969 was one of the worst springs since 1947 and in some areas it was the poorest spring in the whole 25 year period; (seven out of the last ten springs are in the lower half of the rating). 1945 and 1948 and 1961 were very good springs in all areas.

While admitting that more complex methods would give better assessments of quality of spring for particular purposes, it is suggested that the simple rating according to departures from the averages for a (fixed) base period gives a quick and realistic general assessment.

Any comments or suggestions or this paper should be sent to the author.

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